

Reconsideration of the above-identified application is respectfully requested in view of the following remarks.

REMARKS

Applicants affirm the election to prosecute the invention of Group I, including claims 1-21. Applicants reiterate their traverse of the restriction requirement. The Examiner has stated that in the instant case, the processes claimed can be practiced with another materially different product such as a composition not comprising a lanthanide series element. The Examiner will note that the method as set forth in claim 22 includes the use of a NOx reducing composition which contains an acidic oxide support, cerium oxide, at least one oxide of a lanthanide series element other than ceria, and, optionally, an oxide or a transition metal such as from Groups Ib and IIb of the Periodic Table. Accordingly, the method of use as recited in claims 22-29 includes each and every limitation of the composition of claims 1-21. As such, a search of the method of use would require a search of the composition as claimed. Therefore, it is respectfully requested that the restriction requirement be withdrawn. Applicants also respectfully request that if in fact claim 1 is deemed allowable, that the Examiner rejoin claims 22-29 with this application and allow any method claim which is consistent with the allowed composition claim.

The objections to claims 14 and 19 are noted and such claims have been amended to correct the informalities raised by the Examiner. The Examiner is thanked for the careful consideration of the claims. The Examiner will note that claim 3 has also been amended to correct a minor informality in claim language.

Claims 1 and 17 have been amended such that the composition now requires component (iv), at least one oxide of a transition metal selected from Group Ib and IIb of the Periodic Table. Thus, this last component is no longer an optional component, but

must be included in the composition. Amended claims 1 and 17 now patentably distinguish over U.S. 4,839,026, which was cited but not applied. This particular patent discloses a sulfur oxide removal catalyst comprising alumina and a mixture of rare earth oxides. The patent does not disclose the addition of the transition metal from Group Ib or IIb of the Periodic Table as now claimed.

Claims 1-5 and 9-21 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Peters et al. (U.S. 6,129,834) in view of Green et al. (U.S. 4,973,399). The Examiner applies Peters as disclosing a NOx removal composition which comprises an acidic oxide support, cerium oxide, and at least one oxide of a transition metal selected from Groups Ib and IIb of the Periodic Table, and including copper and silver. The reference is also stated as disclosing a composition where the acidic oxide support is either alumina or silica-alumina, and wherein the alumina to silica ratio is from 3:1 to 50:1. The reference is also stated as disclosing a fluid cracking catalyst composition comprising a cracking component and a NOx reduction component, again comprising an acidic oxide support, cerium oxide, and an oxide of a transition metal selected from Groups Ib and IIb of the Periodic Table.

The Examiner states that the primary reference to Peters does not include in the composition at least one oxide of a lanthanide series element other than cerium oxide. To make up for this deficiency in the primary reference to Peters, the Examiner applies Green as disclosing a mixture of lanthanide series oxides in an NOx reducing additive in which the mixture includes lanthanide series oxides other than cerium oxide, including praseodymium oxide. The Examiner concludes that it would be obvious to one of ordinary skill in the art at the time the invention was made to modify the composition of Peters to include a composition comprising at least one oxide of a lanthanide series

element other than cerium oxide such as praseodymium oxide as disclosed by Green.

The rejection is respectfully traversed.

It is the applicant's position that the patent to Green cannot be properly combined with the primary reference to Peters to provide an obviousness rejection and, even if such references can be properly combined, the combination provides a result which is wholly unexpected from the reading of the applied references.

The applied references are not properly combinable in as much as the secondary reference to Green et al. is particularly concerned with a zeolite-containing NOx reducing composition. In fact, the zeolite of Green has a specified silica to alumina ratio of about 20 to about 100. On the other hand, Peters uses as a support for his composition one which preferably contains some alumina, and most preferably contains at least 50 wt. % alumina. When an amorphous silica-alumina support is used, the support has an alumina to silica mole ratio of 3-50:1. Accordingly, Peters prefers to use an alumina containing support in which the alumina is at least present in equal amounts to the silica and, most preferably, where the alumina is present in at least 3 to 50 times the amount of silica. The Peters patent does not disclose any zeolitic type materials useful as a support. The claimed support is like that of Peters. Thus, at page 5, line 22 – page 6, line 22 of the instant specification, useful acidic oxide supports are described as including, for example, transitional aluminas such as gamma and eta alumina, silica-stabilized versions of the aluminas, a silica-stabilized alumina spinel, silica leached kaolins, as well as amorphous oxides including amorphous silica-alumina. Commercial embodiments are described for alumina supports and silica-alumina supports. In particular, zeolitic supports are not included in such discussion. It is believed that non-zeolitic supports are expressed and inferred by such discussion in the present application. The acidic oxide support as a non-zeolitic acidic oxide patentably

distinguishes over the applied reference to Green (U.S. 4,973,399). Differences between zeolites and acidic oxide supports such as alumina and silica-alumina are well known in the art. Zeolites have a microporous character with uniform pore dimensions allowing adsorption selectivity. This property is a reason zeolites are often called molecular sieves. The ion-exchange properties, the ability to develop internal acidity, and high thermal stability distinguishes zeolites over other crystalline or amorphous inorganic oxide materials. Accordingly, one of ordinary skill in the art would not readily consider the composition including a zeolitic support as in Green which contains a higher amount of silica units to act in an equivalent manner as a composition that is supported on a non-zeolite that contains a higher level of alumina, such as disclosed in Peters. Further, the Examiner will kindly note that Green finds that non-zeolitic supports are unacceptable. The Examiner is invited to Examples 13 and 14 of Green wherein the patentee clearly states that the results obtained "demonstrates the desirability of using an additive having a ZSM-5 component" and "clearly indicates no beneficial affect of using...an additive...having no ZSM-5 component." Accordingly, one would not consider any of the results or disclosure of Green for use with a zeolitic support to have any particular benefit in the non-zeolitic support of Peters.

Importantly, it has been found that by providing a mixture of rare earths, at least one of which is cerium, on a non-zeolitic acidic support which further contains copper oxide, the composition has far greater hydrothermal stability than a NO<sub>x</sub> reducing composition containing a non-zeolitic oxide support, copper oxide, and cerium alone. The Examiner is kindly invited to Examples 1-4 of the present application at page 10 and comparative examples A and B which correspond to the composition described in Peters. Table 1 at page 12 of the instant application clearly shows that Examples 1-4, which contained a mixture of rare earths along with copper on an alumina support, have

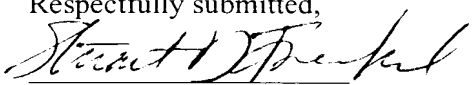
greater NO uptake after steaming than comparative catalysts A and B. These results are quite unexpected, even from the combination of references, in as much as Green, while suggesting that a mixture of rare earths can be used, does not suggest any advantage of doing so over cerium or yttrium alone. There is no discussion in Green of why a mixture of rare earth oxides is used, or that the mixture of rare earths is any different than a single rare earth. The results in the present application clearly show that a mixture of cerium with another rare earth provides a greatly stabilized NO<sub>x</sub> reduction composition and provides a composition having substantially improved NO uptake over a NO<sub>x</sub> reducing composition which contains cerium oxide as a sole rare earth component. The results shown in Table 1 of the application are the antithesis of obviousness, and clearly rebut the conclusion of obviousness raised by the Examiner. Clearly, a NO<sub>x</sub> reducing composition on a non-zeolitic acidic oxide support which contains cerium and another lanthanide metal oxide is not at all equivalent to the same composition which contains cerium as the sole rare earth. Accordingly, it is believed that claims 1-5 and 9-21 patentably distinguish over the combination of references applied by the Examiner.

Claims 6-8 have been rejected under 35 U.S.C. 103 (a) as being unpatentable over Peters in view of Green as applied previously, and further in view of Lussier (U.S. 4,847,225). The Lussier reference is applied as disclosing a composition wherein a silica-alumina is prepared by caustic leaching of silica from calcined kaolin. The Examiner concludes it would have been obvious to one of ordinary skill in the art to modify the composition of Peters and Green to utilize a composition wherein the silica-alumina is prepared by caustic leaching of silica from calcined kaolin. The rejection is respectfully traversed.

First, since Green requires a zeolitic support which contains a majority of silica relative to alumina, it certainly would not be obvious to leach the silica from a kaolin to achieve the support as disclosed in Green. Regardless, the reference to Lussier does not make up for the deficiencies of the applied references as described with respect to the rejection above. Accordingly, this rejection is improper for the same reasons as expressed above, i.e., that Green cannot be properly combined with Peters, and that even if the references are combined, the references as a whole do not suggest the results which have been found by the present inventor. The results which have been found as shown in Table 1 of the present application clearly rebut any suggestion of obviousness of the combination of Peters and Green. Since claims 6-8 ultimately depend on claim 1, these claims are patentably distinguishable over the applied references for the further reasons given above with respect to the rejection of claim 1.

Accordingly, it is respectfully requested that the rejection of claims 1-21 be withdrawn, and that these claims be allowed. Further, in view of the allowability of claims 1 and 17, it is respectfully requested that the Examiner rejoin the method claims 22-29 with the elected invention in as much as independent claim 22 recites the NOx reduction composition described in the first group of claims. Allowance of claims 1-29 is respectfully solicited.

July 11, 2003  
Date

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